AF/IFW

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re PATENT application of:

Applicant(s): William E. Luce
Serial No: 10/671,425
Filed: September 25, 2003
Title: AIRCRAFT SHOCK STRUT HAVING A FLUID LEVEL MONITOR

Examiner: Melanie Torres
Art Unit: 3683

Docket No. GRLGP0318USA (formerly BFGRP0318USA)

APPEAL BRIEF

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

The undersigned submits this brief for the Board's consideration of the appeal of the Examiner's decision, mailed February 25, 2005, finally rejecting claims1-22 of the above-identified application. A credit card payment form covering the fee for filing this brief is enclosed.

I. Real Party in Interest

The real party in interest in the present appeal is Goodrich Corporation.

II. Related Appeals and Interferences

Neither appellant, appellant's legal representative, nor the assignee of the present application are aware of any appeals or interferences which will directly affect,

which will be directly affected by, or which will have a bearing on the Board's decision in the pending appeal.

III. Status of Claims

Claims 1-22 were finally rejected. However, an amendment under 37 CFR 41.33 (a) has been submitted prior to the filing of this brief and presumably will be entered. Assuming entry of the amendment, claims 2-17, 21 and 22 will be the subject of this appeal. A correct copy of these claims is reproduced in Appendix A.

IV. Status of Amendments

As above noted, an amendment under 37 CFR 41.33 (a) was submitted prior to the filing of this brief. No action has been received on such amendment. Nevertheless, it is believed the amendment will be entered as it reduces the issues on appeal and corrects obvious defects in the dependency of three claims.

V. Summary of Invention Defined in the Claims on Appeal

The following is a concise explanation of the subject matter defined in each of the independent claims involved in this appeal, which refers to the specification by page and line number, and to the drawing by reference characters.

<u>Claim 2</u>

An aircraft shock strut 10 [4/23] comprising a cylinder 32 [5/1], a piston 30 telescopically movable within the cylinder [5/1-8] and defining therein a sealed chamber

42 partially filled with a liquid and partially filled with a gas [6/1-9], and at least one probe 80/82 associated with the chamber for sensing a condition of a level of liquid in the chamber through interaction with the liquid in the chamber [6/25-7/21]; and a cable 41 that passes through a wall of the strut for connecting to the probe [6/25-32].

Claim 12

An aircraft shock strut 10 [4/23] comprising a cylinder 32 [5/1], a piston 30 telescopically movable within the cylinder [5/1-8] and defining therein a sealed chamber 42 partially filled with a liquid and partially filled with a gas [6/1-9], and at least one probe 80/82 associated with the chamber for sensing a condition of a level of liquid in the chamber through interaction with the liquid in the chamber [6/25-7/21]; wherein the at least one probe includes a plurality of probes 80 and 82 spaced apart along a longitudinal axis of the strut [7/1-13].

Claim 13

An aircraft shock strut 10 [4/23] comprising a cylinder 32 [5/1], a piston 30 telescopically movable within the cylinder [5/1-8] and defining therein a sealed chamber 42 partially filled with a liquid and partially filled with a gas [6/1-9], and at least one probe 80/82 associated with the chamber for sensing a condition of a level of liquid in the chamber through interaction with the liquid in the chamber [6/25-7/21]; wherein the probe is a liquid level sensing fiber optic probe [7/14-21].

Claim 14

An aircraft shock strut 10 [4/23] comprising a cylinder 32 [5/1], a piston 30 telescopically movable within the cylinder [5/1-8] and defining therein a sealed chamber

42 partially filled with a liquid and partially filled with a gas [6/1-9], and at least one probe 80/82 associated with the chamber for sensing a condition of a level of liquid in the chamber through interaction with the liquid in the chamber [6/25-7/21]; wherein the at least one probe includes two probes, a first one of which detects a condition of a first liquid level and a second one of which detects a condition of a second liquid level [7/1-13].

Claim 15

A system comprising an aircraft shock strut 10 [4/23] comprising a cylinder 32 [5/1], a piston 30 telescopically movable within the cylinder [5/1-8] and defining therein a sealed chamber 42 partially filled with a liquid and partially filled with a gas [6/1-9], and at least one probe 80/82 associated with the chamber for sensing a condition of a level of liquid in the chamber through interaction with the liquid in the chamber [6/25-7/21]; and a processor 39 in communication with the probe for processing a signal from the probe related to the level of liquid in the chamber [5/15-21].

Claim 21

A shock absorber 10 [4/23] comprising a cylinder 32 [5/1], a piston 30 telescopically movable within the cylinder [5/1-8] and defining therein a sealed chamber 42 partially filled with a liquid and partially filled with a gas [6/1-9], and at least one probe 80/82 associated with the chamber for sensing a condition of a level of liquid in the chamber through interaction with the liquid in the chamber [6/25-7/21]; wherein the at least one probe includes at least one fiber optic probe [7/14-21].

VI. Applied Prior Art

1. U.S. Patent No. 4,092,947 (referred to herein as "Labrecque")
2. U.S. Published Application No. 2002/0124643 (referred to herein as "Robinson")
3. U.S. Patent No. 6,244,398 (referred to herein as "Girvin et al.")

VII. Grounds of Objection/Rejection to Be Reviewed on Appeal[1]

A. Claims 2-4, 10-17, 21 and 22 stand finally rejected under 35 U.S.C. § 103(a) as being unpatentable over Labrecque in view of Robinson.

B. Claims 5-9 stand finally rejected under 35 U.S.C. § 103(a) as being unpatentable over Labrecque in view of Robinson and further in view of Girvin et al.

VIII. Argument

The rejections advanced by the Examiner are improper and should be reversed for at least the following reasons.

A. Rejection of Claims 2-4, 10-17, 21 and 22 under 35 U.S.C. § 103(a)

Claims 2-4, 10-17, 21 and 22 stand finally rejected under 35 U.S.C. § 103(a) as being unpatentable over Labrecque in view of Robinson. The Examiner's remarks in support of the rejection are as follows:

[1] An amendment has been submitted to cancel claims 1 and 18-20, thereby rendering moot the final rejection of said claims under 35 U.S.C. § 102(b).

Re claims 2-4, 10-17, 21 and 22, Labrecque does not teach a cable that passes through the wall of the strut for connecting to the probe. Robinson discloses a cable (5) that passes through the wall of the strut for connecting to the probe. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included the cable of Robinson with the probe of Labrecque to allow for remote viewing of the fluid level.

Claim 2

Robinson discloses a liquid level sensor for a liquid tank. Robinson, however, has nothing to do with a shock absorber and much less an aircraft shock strut. A shock absorber and more particularly an aircraft shock strut are dynamic devices including relatively moving parts which interact with a gas and liquid contained in a dynamically changing and sealed chamber to perform a shock absorbing or dampening function. In contrast, Robinson is used to indicate the level of a liquid in a tank that does not dynamically change in configuration during use, and there is lacking any suggestion or hint of using the devices or features of Robinson in a shock absorber and much less in an aircraft shock strut.

The above-noted distinction is more than an insignificant difference. Only Labrecque discloses an oil level indicator for use in a landing gear strut. The indicator of Labrecque is operated by over-displacement of the piston. The indicator includes a rod 14 that extends through an end wall of the strut's cylinder to provide a visual indication of the quantity of oil in the strut. Thus, there is absolutely no need for a cable that passes through a wall of the strut for connecting to a probe.

Claim 3

Claim 3 depends from claim 2 and additionally specifies the cable including at least one optical fiber. It is not seen how the indicator of Labrecque can make any use whatsoever of an optical fiber. The optical fiber of Robinson transmits light, but there is no light to be transmitted in the indicator of Labrecque.

Claim 4

Claim 4 depends from claim 3 and additionally specifies an optical liquid sensing probe. It is not seen how the indicator of Labrecque can make any use whatsoever of an optical liquid sensing probe.

Claim 10

Claim 10 depends from claim 2 and specifies the probe and cable being assembled together as a unit, a guide tube being mounted within the chamber, and the unit at least partially extending through and being located by the guide tube. It is not seen how the indicator of Labrecque can make any use whatsoever of a unit including a probe and cable and which at least partially extends through and is located by a guide tube. The Examiner has not explained how Labrecque's indicator can be modified to include a probe and a cable assembled as a unit, and much less how such unit can be located by a guide tube.

Claim 11

Claim 11 depends from claim 10 and specifies the unit is removable as a unitary piece from the strut. The Examiner has offered no explanation as to how this feature is

disclosed or suggested by the applied references, presumably because there is no such disclosure.

Claim 12

Claim 12 recites an aircraft shock strut comprising, *inter alia*, a plurality of probes for sensing a condition of a level of liquid in the sealed chamber strut and which probes are spaced apart along a longitudinal axis of the strut. While the Examiner has argued It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included the cable of Robinson with the probe of Labrecque to allow for remote viewing of the fluid level, the Examiner has not explained why it would have been obvious for Labrecque to have been modified to include plural probes spaced along a longitudinal axis of the strut. First, there is no basis for combining Robinson with Labrecque for the reasons discussed above in connection with claim 2. Second, it is not seen how Labrecque could include a second indicator in the manner taught by Labrecque, nor how such indicators would be spaced along the longitudinal axis of the strut.

Claim 13

Claim 13 recites an aircraft shock strut comprising, *inter alia*, a liquid level sensing fiber optic probe. It is not seen how the indicator of Labrecque can make any use whatsoever of a liquid level sensing fiber optic probe and the Examiner has provided no explanation other than to state that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included the cable of

Robinson with the probe of Labrecque. Labrecque has no need for an optical cable or optical probe.

Claim 14

Claim 14 recites an aircraft shock strut comprising, *inter alia*, two probes, a first one of which detects a condition of a first liquid level and a second one of which detects a condition of a second liquid level. It is not seen how the indicator of Labrecque can make any use whatsoever of one and much less two such probes, and the Examiner has provided no explanation other than to state that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included the cable of Robinson with the probe of Labrecque. Labrecque has no need for an optical cable or optical probe.

Claims 15-17

Claims 15-17 recite an aircraft shock strut comprising, *inter alia*, a probe for sensing a condition of a level of liquid in the chamber in the chamber, and a processor in communication with the probe for processing a signal from the probe related to the level of liquid in the chamber. It is not seen how the indicator of Labrecque can make any use whatsoever of a processor for processing a signal from a probe, and the Examiner has provided no explanation other than to state that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included the cable of Robinson with the probe of Labrecque. Labrecque has no need for an optical cable or optical probe.

Claim 21

Claim 21 recites more generally a shock absorber that comprises, *inter alia*, at least one fiber optic probe for sensing a condition of a level of liquid in a sealed chamber in the shock absorber. It is not seen how the indicator of Labrecque can make any use whatsoever of fiber optic probe and the Examiner has provided no explanation other than to state that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included the cable of Robinson with the probe of Labrecque. Labrecque has no need for an optical cable or optical probe.

Claim 22

Claim 22 depends from 21 and further specifies the distal end of the probe including a retro-reflective prism. Both Labrecque and Robinson have been searched and no mention of a retro-reflective prism has been found. Thus, for this additional reason the rejection as applied to claim 22 should be withdrawn.

B. Rejection of Claims 5-9 under 35 U.S.C. § 103(a)

Claims 5-9 stand finally rejected under 35 U.S.C. § 103(a) as being unpatentable over Labrecque in view of Robinson and further in view of Girvin et al. The Examiner's remarks in support of the rejection are as follows:

> Re claims 5 and 6, Labrecque as modified does not teach a fitting assembly that seals a cable with respect to the strut. Girvin et al. teaches a fitting assembly (84) that seals a cable with respect to a strut. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided the fitting assembly of Girvin et al. in

the strut of Labrecque as modified in order to provide a secure assembly of components.

Re claims 7-9, Labrecque as modified does not teach wherein the plug has an annular groove for receiving an o-ring seal. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided an o-ring seal, since seals are well known in shock absorbers for use at critical locations for adequate sealing this preventing leakage of the working fluids.

Claim 5

Claim 5 depends from claim 2 and, accordingly, that arguments presented above in relation to claim 2 are equally applicable to claim 5. In addition, claim 5 additionally specifies a fitting assembly that seals the cable with respect to the strut. It is not seen how the indicator of Labrecque can make any use whatsoever of a fitting assembly that seals a cable with respect to the strut since there is no cable to be sealed in the first place.

Claim 6

Claim 6 depends from claim 5 and additionally specifies a fitting assembly that includes a plug molded around the cable and a retainer for holding the plug in sealed relationship with a through passage in the strut. It is not seen how the indicator of Labrecque can make any use whatsoever of such a fitting assembly, nor has the Examiner indicated any disclosure in Labrecque, Robinson or Girvin et al. of a plug that is molded around a cable and a retainer for holding the plug in sealed relationship with

a through passage in a strut or other structure. In Grivin et al., there is no mention of the wire seal 84 being molded to the wire 82.

Claim 7

Claim 7 depends from claim 6 and additionally specifies the plug having an annular groove for receiving an O-ring seal. The Examiner has not indicated any disclosure in Labrecque, Robinson or Girvin et al. of a plug that is molded around a cable and has an annular groove for receiving an O-ring seal, and much less in a combination similar to that claimed.

Claim 8

Claim 8 depends from claim 6 and additionally specifies the cable including at least one optical fiber and the plug being molded directly to the optical fiber to effect a seal around the optical fiber. It is not seen how the indicator of Labrecque can make any use whatsoever of an optical fiber as noted above, nor has the Examiner indicated any disclosure in Labrecque, Robinson or Girvin et al. of a plug that is molded directly to an optical fiber to effect a seal around the optical fiber.

Claim 9

Claim 9 depends from claim 6 and additionally specifies the cable including a plurality of optical fibers that have transversely spaced apart, coextending portions thereof each surrounded in sealed relationship by the plug that has been molded thereto. It is not seen how the indicator of Labrecque can make any use whatsoever of one much less a plurality of optical fibers. In addition, the Examiner has not indicated any disclosure in Labrecque, Robinson or Girvin et al. of a plug that is molded to a

plurality of optical fibers to effect a seal around the optical fibers. In Grivin et al., there is no mention of the wire seal 84 being molded to the wire 82 and much less to plural wires with each wire surrounded in sealed relationship by a plug molded thereto.

IX. ***Conclusion***

In view of the foregoing, it is respectfully submitted that the claims are patentable over the applied art and that the final rejection should be reversed.

Respectfully submitted,

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CERTIFICATE OF MAILING

I hereby certify that this paper (along with any paper or item referred to as being attached or enclosed) is being deposited with the U.S. postal service on the date shown below with sufficient postage as first-class mail in an envelope addressed to Mail Stop Appeal Brief-Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

Date: November 1, 2005

Don W. Bulson

Appendix A

Claims on Appeal

2. An aircraft shock strut, comprising a cylinder; a piston telescopically movable within the cylinder and defining therein a sealed chamber partially filled with a liquid and partially filled with a gas; at least one probe associated with the chamber for sensing a condition of a level of liquid in the chamber through interaction with the liquid in the chamber; and a cable that passes through a wall of the strut for connecting to the probe.

3. A shock strut as set forth in claim 2, wherein the cable includes at least one optical fiber.

4. A shock strut as set forth in claim 3, wherein the probe is an optical liquid sensing probe.

5. A shock strut as set forth in claim 2, further comprising a fitting assembly that seals the cable with respect to the strut.

6. A shock strut as set forth in claim 5, wherein the fitting assembly includes a plug molded around the cable and a retainer for holding the plug in sealed relationship with a through passage in the strut.

7. A shock strut as set forth in claim 6, wherein the plug has an annular groove for receiving an O-ring seal.

8. A shock strut as set forth in claim 6, wherein the cable includes at least one optical fiber and plug is molded directly to the optical fiber to effect a seal around the optical fiber.

9. A shock strut as set forth in claim 6, wherein the cable includes a plurality of optical fibers that have transversely spaced apart, coextending portions thereof each surrounded in sealed relationship by the plug that has been molded thereto.

10. A shock strut as set forth in claim 2, wherein the probe and cable are assembled together as a unit, and wherein a guide tube is mounted within the chamber, the unit at least partially extending through and being located by the guide tube.

11. A shock strut as set forth in claim 10, wherein the unit is removable as a unitary piece from the strut.

12. An aircraft shock strut, comprising a cylinder; a piston telescopically movable within the cylinder and defining therein a sealed chamber partially filled with a liquid and partially filled with a gas; and at least one probe associated with the chamber for sensing a condition of a level of liquid in the chamber through interaction with the liquid in the chamber; wherein the at least one probe includes a plurality of probes spaced apart along a longitudinal axis of the strut.

13. An aircraft shock strut, comprising a cylinder; a piston telescopically movable within the cylinder and defining therein a sealed chamber partially filled with a liquid and partially filled with a gas; and at least one probe associated with the chamber for sensing a condition of a level of liquid in the chamber through interaction with the liquid in the chamber; wherein the probe is a liquid level sensing fiber optic probe.

14. An aircraft shock strut, comprising a cylinder; a piston telescopically movable within the cylinder and defining therein a sealed chamber partially filled with a liquid and partially filled with a gas; and at least one probe associated with the chamber for sensing a condition of a level of liquid in the chamber through interaction with the liquid in the chamber; wherein the at least one probe includes two probes, a first one of

which detects a condition of a first liquid level and a second one of which detects a condition of a second liquid level.

15. A system comprising an aircraft shock strut, comprising a cylinder; a piston telescopically movable within the cylinder and defining therein a sealed chamber partially filled with a liquid and partially filled with a gas; and at least one probe associated with the chamber for sensing a condition of a level of liquid in the chamber through interaction with the liquid in the chamber; and a processor in communication with the probe for processing a signal from the probe related to the level of liquid in the chamber.

16. A system as set forth in claim 15, wherein probe is a level sensing optical probe, and further comprising a sensor unit external to the chamber and connected by an optical cable to the probe within the chamber, the sensor unit functioning to transmit light to the probe and receive reflected light from the probe via the optical cable, and wherein the sensing unit is connected to the processor.

17. A system as set forth in claim 15, wherein probe is a level sensing optical probe, and further comprising a sensor unit external to the chamber and connected by an optical cable to the probe within the chamber, the sensor unit functioning to transmit light to the probe and receive reflected light from the probe via the optical cable.

21. A shock absorber comprising a cylinder; a piston telescopically movable within the cylinder and defining therein a sealed chamber partially filled with a liquid and partially filled with a gas; and at least one probe associated with the chamber for sensing a condition of a level of liquid in the chamber through interaction with the liquid in the chamber; wherein the at least one probe includes at least one fiber optic probe.

22. A shock absorber as set forth in claim 21, wherein the distal end of the probe includes a retro-reflective prism.